

CLAIMS:

The embodiments of an invention in which an exclusive property or right is claimed are defined as follows:

1. An integrated vertical cavity surface emitting laser and power monitor assembly, comprising:

a vertical cavity surface emitting laser for producing a light beam along a light path;

a substrate having an etched cavity in said light path; and

a light sensor on said substrate and along said light path;

wherein said vertical cavity surface emitting laser is attached to said substrate.

2. An assembly according to claim 1, wherein said substrate includes a thin membrane between said etched cavity and said vertical cavity surface emitting laser.

3. An assembly according to claim 2 wherein said light sensor is on said thin membrane.

4. An assembly according to claim 1, wherein said light sensor is a metal-semiconductor-metal light sensor.

5. An assembly according to claim 1, wherein said substrate includes an aperture in said light path, wherein said aperture extends from said light sensor to said etched cavity.

6. An assembly according to claim 1, further including a metal contact on said substrate, wherein said vertical cavity surface emitting laser is attached to said substrate via said metal contact.

7. An assembly according to claim 6, wherein said vertical cavity surface emitting laser receives electrical power via said metal contact.

8. An integrated vertical cavity surface emitting laser and power monitor assembly, comprising:

a vertical cavity surface emitting laser for producing a light beam along a light path;

a substrate having an etched cavity in said light path;

a light sensor on said substrate and along said light path;

an optical fiber in said etched cavity and aligned in said light path

wherein said vertical cavity surface emitting laser is attached to said substrate.

9. An assembly according to claim 8, further comprising an optical element between said optical fiber and said vertical cavity surface emitting laser.

10. An assembly according to claim 9, wherein said optical element couples light from said vertical cavity surface emitting laser into said optical fiber.

11. An assembly according to claim 10, wherein said optical element is in said etched cavity, and wherein said optical element and said optical fiber are held in said etched cavity using an adhesive.

12. An assembly according to claim 11, wherein said adhesive includes epoxy.

13. An assembly according to claim 8, further including a controller for controlling said light beam based on a signal from said light sensor.

14. A method of fabricating a semiconductor assembly, comprising:
etching a substrate to form a cavity;
forming a photodetector on the substrate; and
mounting a vertical cavity surface emitting laser on the substrate such that light emitted from the vertical cavity surface emitting laser travels along a light path that irradiates the photodetector.

15. A method according to claim 14, wherein the cavity is formed by anisotropic etching.

16. A method according to claim 15, wherein the anisotropic etching results in a thin membrane between the cavity and a top of the silicon wafer, and wherein the photodetector is formed on the thin membrane.

17. A method according to claim 16, wherein at least part of the thin membrane is removed.
18. A method according to claim 14, further including:
forming a metal contact on the substrate; and
attaching the vertical cavity surface emitting laser to the metal contact.
19. A method according to claim 14, further including;
disposing an optical element in the etched cavity;
locating an end of an optical fiber in the etched cavity such that the end of the optical fiber is optically aligned with the disposed optical element; and
sealing the disposed optical element and the end of the optical fiber in the etched cavity.
20. A method according to claim 14, further including making electrical connections between a controller and the photodetector and the vertical cavity surface emitting laser.
21. A assembly according to claim 1, wherein the substrate includes a silicon substrate.
22. A assembly according to claim 8, wherein the substrate includes a silicon substrate.

23. A method according to claim 14, wherein the substrate includes a silicon substrate.